"THE STARTING POINT OF SUB-MARINE TELEGRAPHY."

SIR C. WHEATSTONE'S PLANS.

(Date 1837-1846.)

To accompany detailed drawings made in October, 1840.

"THE STARTING POINT OF SUBMARINE TELEGRAPHY."

25, Cumberland Terrace, Regent's Park, N.W.
15*th February*, 1876.

To the Secretary of the Society of Telegraph Engineers.

Dear Sir,—As the Members of the Society of Telegraph Engineers have at the moment under discussion the subject of Submarine Telegraphy, it has been suggested to me that it might be interesting to them, from a historical point of view, to inspect the drawings made to illustrate the earliest plan on record—that suggested by the late Professor Wheatstone—for the establishment of a submarine telegraph between France and England.

I have therefore sent you these drawings, and I shall be much obliged if you will kindly have them placed upon the table for the inspection of the Members at the next meeting.

From the perusal of old letters which have recently come into my possession, I find that a submarine electric telegraph was, as early as 1837, a theme upon which Professor Wheatstone was greatly interested, and upon the preliminary details of which he appears to have spent a good deal of time.

The earliest printed mention of this scheme is to be found in the fifth Railway Report of the Select Committee of the House of Commons. When under examination before this Committee, on the 6th of February, 1840, Professor Wheatstone gave evidence as to his opinion of the practicability of establishing an electric communication by means of a cable between Dover and Calais.

On reference to *Le Fanal*, a Brussels paper of the 30th September, 1840, you will find it stated that: "M. Wheatstone pense qu'il est possible de communiquer avec son appareil entre

Douvres et Calais; il répète en ce moment ses expériences à l'Observatoire de Bruxelles, en presence de plusieurs savans littérateurs."

And in the *Bulletin de l'Academie Royale de Bruxelles*, for October 7th, 1840, you will find a notice of Professor Wheatstone's new telegraph instruments, written by Professor Quetelet, in which it is stated: "On sera sans doute charmé d'apprendre que l'auteur a trouvé le moyen de transmettre les signaux entre l'Angleterre et la Belgique, malgré l'obstacle de la mer. Son voyage se rattachait en partie à cette importante opération, qui mettrait l'Angleterre en rapport immédiat avec notre pays, la France, la Hollande, l'Allemagne, et même la Russie."

After making his experiments in the Observatory at Brussels, Professor Wheatstone appears to have returned to England and to have occupied himself diligently with the preparation of the two detailed plans which I have the pleasure of sending you. I find from a note in his handwriting that they were completed in October 1840, and were exhibited to a great number of visitors at King's College.

SHEET I. shows the method of insulating and making the cable, and how it is to be put on board the laying-ship. It contains:

(1) A section, end-view, and plan of the apparatus for wrapping the copper conductor with its insulating cord;

(2) The elevation and end-view of a machine for simultaneously covering seven such wires to form a cable;

(3) A section and plan of a machine for binding the seven covered wires with an outer serving of cord so as to combine them into a cable; and,

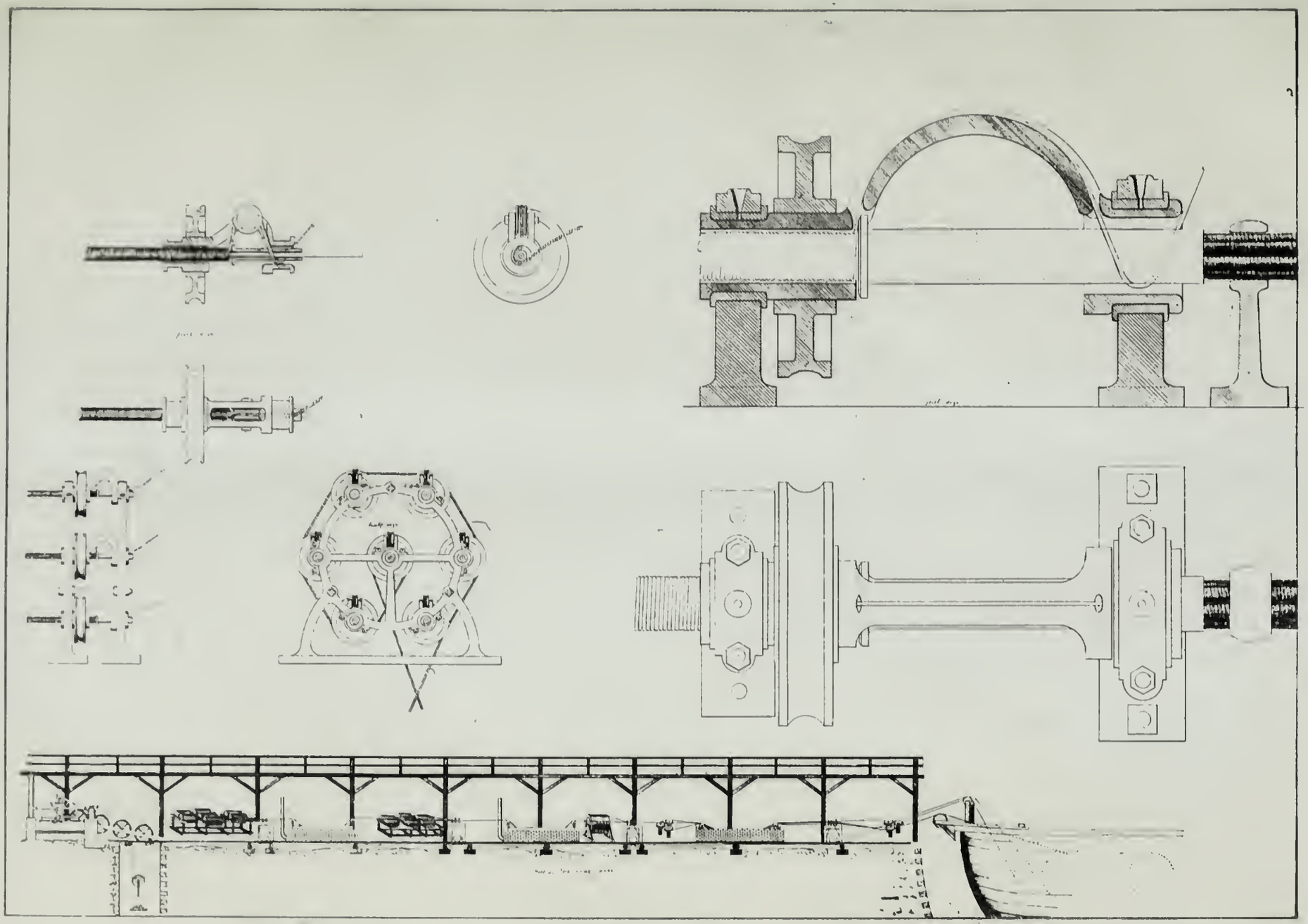
(4) Along the bottom of the drawing how the cable, in its various stages, is to be passed through baths of insulating material, and how it finally reaches the ship.

SHEET II. shows the proposed route of this cable, and the methods of laying, joining, and under-running. It contains:

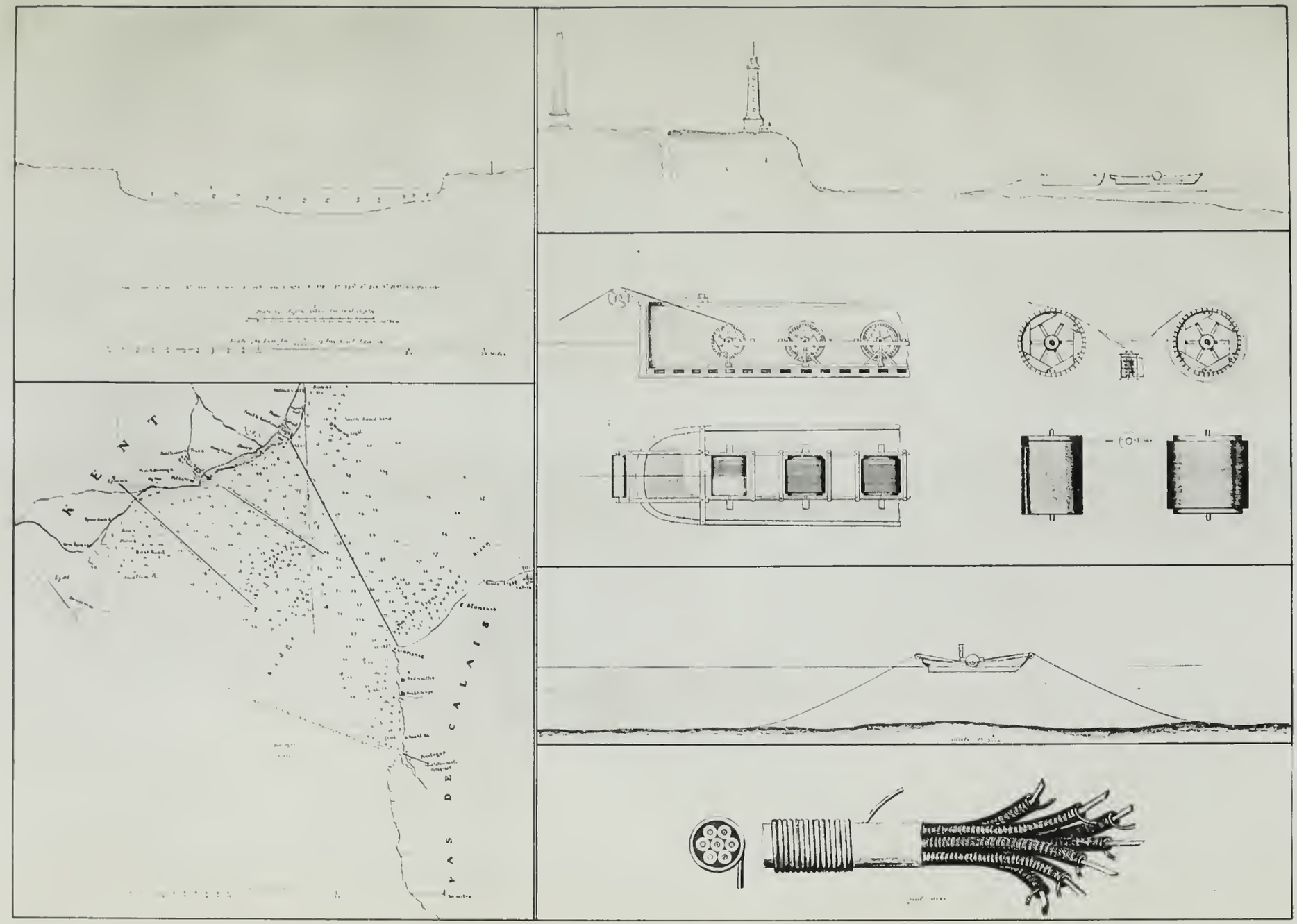
(1) A section and chart * of the channel between the South Foreland and Cape Grisnez;

* "Captain White's chart of the English Channel, given me by Captain Beaufort." —MS. note.

SIR C. WHEATSTONE'S ORIGINAL PLANS FOR A SUBMARINE CABLE (DATE 1840).



SIR C. WHEATSTONE'S ORIGINAL PLANS FOR A SUBMARINE CABLE (DATE 1840).



SHEET II. Proposed destination of the Cable, and methods of laying, jointing, and underrunning.

(2) The cable-barge being towed by a steamer and paying out the cable;

(3) A section and plan of the stern end of the cable-barge, showing three of the drums on which the cable was to be sent to sea;

(4) The method of connecting the end of the cable from one drum to that on another;

(5) The steamer under-running to find a fault; and finally,

(6) A section and perspective of a piece of the proposed cable.

These drawings were executed for Professor Wheatstone by a Polish draughtsman, named Lutowski, who was at the time in his employ.

I find a MS. article in his handwriting, entitled, "On a means of establishing an Electric Telegraph between the coasts of England and France," in which occurs the following passage: "Each wire should form the core of a rope line well saturated with boiled tar, and all the lines be made into a rope prepared in the same manner." This gives an idea of the kind of insulation contemplated in 1840.

In the year following (1841), Professor Wheatstone appears to have gone with his scheme and these drawings to Paris. During his stay there, he says, in a MS. note, that he let Mr. J. Joseph Silbermann take tracings of the drawings.*

Professor Wheatstone does not appear to have confined his cable scheme to joining France and England; for towards the end of 1840 I find him in correspondence with Captain Beaufort of the Admiralty, who, in a letter dated 19th December, 1840, encloses the depths between Portsmouth and Gosport, and between Portpatrick and Donaghadee, and promises further aid in the matter.

But the Channel telegraph still appears to have been the ultimate object, for I find a letter dated April 5, 1843, from his solicitor, Mr. Richardson, in which, referring to some documents then in course of preparation, he says: "I have introduced your right to establish telegraph communication between France and England."

* "These tracings I find, from a letter, dated 22 July, 1855, from Mr. Silbermann (College de France), were lent by him subsequently to M. Pouillet, who deposited them in the Conservatoire des Arts et Metiers."

A preliminary experiment on a less ambitious scale seems however to have been wisely determined on. And, in the month of September 1844, there is a memorandum in the handwriting of Professor Wheatstone, that in company with a Mr. J. D. Llewellyn he made experiments on submerged insulated wires in Swansea Bay. I find a letter from Mr. J. D. Llewellyn in which he says that they "went out in a boat making communication with the Mumble-head lighthouse and testing the efficiency of various kinds of insulation." . . . . . "The old lighthouse-keeper had been an assistant of some sort to W. Snow Harris, and took great interest in what was going on." . . . . . "he was an intelligent man, and gave every help in his power by reading the signals and communicating with us in the boat." . . . . . "made trials in deep water and among wet seaweed on the shore."*

Professor Wheatstone after his experience in Swansea Bay returned with renewed vigour to his original Channel project. Dated September 1845, I find the following interesting letter from him to Captain Beaufort, R.N., Admiralty:

"20, Conduit Street, Sept. 23rd, 1845.

My dear Sir,—I am now preparing some experiments to test the practicability of establishing an electric telegraph across the Channel from Dover to Calais. To this end you were so kind as to give me several years ago the necessary charts and other valuable information. You will add to the obligation I then incurred by assisting me in the solution of any of the following questions:

"1. Will the current at any part of the passage across the Channel have any effect in displacing a rod or tube of lead, being in diameter from a quarter to half an inch?

"2. What would be the effect of a ground-swell on such a rod or tube?

"3. What is the depth of the sand above the chalk in various parts of the passage?

* J. Dillwyn Llewellyn, Penllergare, Swansea, Oct. 24th, 1866. The contents of this letter are confirmed by a letter from his brother, Mr. L. L. Dillwyn, Hendrefoden, Swansea, 23rd October, 1866, who says, "I well remember you making the experiments to which you allude when you were staying with my father."

"4. How much time would elapse before the rod or tube would become imbedded in the sand?

"5. Is any danger to the tube to be apprehended from the anchoring of vessels, the dredging of fishermen, or the raking of smugglers; and, if so, how is such danger to be avoided?

"6. What is the effect of the long-continued action of sea-water upon lead?

"7. Is there any lighthouse on the coast of England, or an island, or rock, within a mile from the land, where a telegraphic communication to the shore would be useful? Or is there any guard-ship for which it would be an object to transmit instantaneous intelligence to the shore?

"I remain &c.,

"C. WHEATSTONE."

The allusion to lead tube in some of these questions explains the meaning of a long bill which I find, dated between December 1845 and May 1846, from Mr. W. H. Darker, of 9, Paradise Street, Lambeth, for making experiments "to enclose a copper wire insulated with worsted and marine glue in a lead pipe." And on 11th August, 1846, a bill from Mr. H. Mapple for "making nine thousand feet of tube-protected wire;" enumerating the materials as "lead, copper wire, marine glue, and cotton."

Between June and August 1846, I find letters from Mr. W. H. Hatcher, Engineer to the Electric Telegraph Company, with regard to a proposed line of telegraph in lead tube for crossing the harbour at Portsmouth, for which the above was probably intended.

It may be interesting to the members of the Society to know that as early as 1845 Professor Wheatstone contemplated employing gutta-percha in the construction of his proposed cables; but how he proposed to apply it is not clear. In 1845 I find him in correspondence on the subject with a Mr. Edward Solly of Bedford Row, who promises to procure some for him; and on October 18th of that year I find a letter from a Mr. J. S. Lister, lamenting "that there is no gutta-percha in the market, that the last parcel was purchased by Mr. Hancock of Charing Cross, and that its value is about 1*s.* per lb., that the supplies expected for the next two

years have been bought up by some party who has a patent for the use of it in an atmospheric Railway."

So far as I have had time to examine Professor Wheatstone's old papers, I have not found much else than the above which bears historically upon the subject, but my search is not yet complete.

The practical and engineering details which are embodied in these plans and suggestions appear of course to be very crude, and the electrical part to be very insufficient when judged by the measure of our present knowledge; but it is necessary to remember that this pioneering work was all in process of creation years before such a thing as a real submarine cable was seriously attempted, and the author of them had no experience of any analogous operation to guide him. Viewed in this light, I feel sure that the Members will regard these two drawings as most interesting relics in the earliest history of submarine telegraphy, and that the length of this letter will be pardoned in consequence.

I am, dear Sir,

Yours very truly,

ROBERT SABINE.

NOTE.—The two accompanying illustrations have been done from negatives taken directly from fac-similes of the original drawings by the photo-lithographic process. The dimensions of the original sheets are 28″ × 20″.